

**(19) World Intellectual Property  
Organization  
International Bureau**



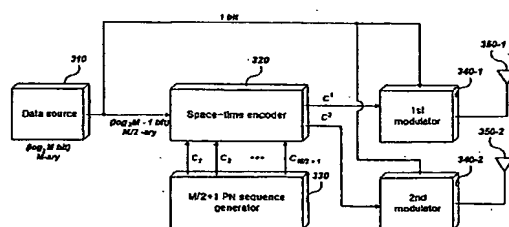
**PCT**

**(10) International Publication Number**  
**WO 2005/088862 A1**

- (51) **International Patent Classification<sup>7</sup>:** **H04B 7/02**  
 Daejeon-city, 302-243 (KR). BAI, Dong-Woon [KR/KR];  
 Hanvit Apt. 132-901, Eoeun-dong, Yuseong-gu, Dae-  
 jeon-city, 305-755 (KR).  
 (21) **International Application Number:**  
 PCT/KR2004/003385  
 (22) **International Filing Date:**  
 21 December 2004 (21.12.2004)  
 (25) **Filing Language:** Korean  
 (26) **Publication Language:** English  
 (30) **Priority Data:**  
 10-2004-0018330 18 March 2004 (18.03.2004) KR  
 (71) **Applicant (for all designated States except US):** Elec-  
 tronics and Telecommunications Research Institute  
 [KR/KR]; 161, Gajeong-dong, Yuseong-gu, Daejeon,  
 305-350 (KR).  
 (72) **Inventors; and**  
 (75) **Inventors/Applicants (for US only):** LEE, Woo-Yong  
 [KR/KR]; Hanvit Apt. 112-405, Eoeun-dong, Yuseong-gu,  
 Daejeon-city, 305-755 (KR). OH, Hyun-Seo [KR/KR];  
 Daejayeonmaeul Apt. 107-301, Gwanjeong-dong, Seo-gu,  
 Daejeon-city, 302-243 (KR). BAI, Dong-Woon [KR/KR];  
 Hanvit Apt. 132-901, Eoeun-dong, Yuseong-gu, Dae-  
 jeon-city, 305-755 (KR).  
 (74) **Agent:** YOU ME PATENT AND LAW FIRM; Seolim  
 Bldg., 649-10, Yoksam-dong, Kangnam-ku, Seoul 135-080  
 (KR).  
 (81) **Designated States (unless otherwise indicated, for every  
 kind of national protection available):** AE, AG, AL, AM,  
 AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
 CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
 GB, GD, GE, GH, GM, GR, HU, ID, IL, IN, IS, JP, KE,  
 KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG,  
 MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH,  
 PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM,  
 TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
 ZW.  
 (84) **Designated States (unless otherwise indicated, for every  
 kind of regional protection available):** ARIPO (BW, GH,  
 GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
 ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
 European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
 FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

[Continued on next page]

(54) Title: DIVERSITY TRANSMITTER-RECEIVER IN CDMA SYSTEM USING SPACE-TIME CODE, AND METHOD THEREOF



**(57) Abstract:** A diversity transmitting/receiving apparatus and method is provided, which is implemented using space-time trellis codes (STTC) constructed from a Pseudo Noise (PN) sequence set in a Direct Sequence (DS) CDMA system. The transmitter comprises a PN sequence generator, a space-time encoder, first and second modulators, and first and second multiple transmit antennas. The space-time encoder selects two of the multiple PN sequences to construct STTC, and space-time encodes data from a data source according to the STTC to output an Wary data symbol. The two modulators modulate the space-time encoded data according to the STTC. The two multiple transmit antennas wirelessly transmit outputs of the two modulators, respectively. By applying a method using space-time coding in a DS CDMA system including multiple transmit antennas, it is possible to achieve both diversity and additional coding gain and also to reduce multiple user interference by increasing the PN sequence length.

**WO 2005/08862 A1**

WO 2005/088862 A1



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *with international search report*